

TITLE OF THE INVENTION

COMPUTER-BASED NETWORK PRINTING SYSTEM AND METHOD

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BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to a computer-based network printing method and system, which enables printing from a printer connected, directly or indirectly, in a network system to a host computer, terminal computers and other printers.

Description of the Related Art:

Computer networks and printers that connect to the network are not new. These network print systems include a host computer, terminal computers and printers, all of which are interconnected by way of a computer communications network. The host computer manages the terminal computers that are used by respective network users. The users are able to access various printers because the printers are connected to the network and are thus, common network resources. There are various places where the printers may be located. For example, all printers may be located in the same place, different places in one building, or distributed throughout different buildings.

As recognized by the present inventor, conventional network print systems have problems. For example, a user must select one of the network printers as a prerequisite for printing. Therefore, the print output is directed to the selected printer and not another one of the available printers. Security is another problem. Conventional network printing systems

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2 have a number of users with a number of printers, where the printed output of the respective printers are available for inspection by other users. Moreover, suppose a user prints a confidential documents on a selected printer, which is connected^{to} a network system, other user can observe, or extract, the contents of the printed document (inadvertently, or intentionally).

5 Japanese patent document, JLOP 4-48323 shows a print server, which has a stacker for stacking printed documents. In this print server, the stacker has a feature that allows the user to take the printed documents only when the user inputs a correct password. Thus, the only the user who has the proper password privilege can observe or extract the printed document.

10 However, in this conventional print server, the user can only retrieve the printed document from the selected printer, and therefore, cannot retrieve the document from another printer. Attempting to designate multiple or all printers for printing the document gives rise to a security problem.

SUMMARY OF THE INVENTION

15 Accordingly, an object of the present invention is to provide a novel computer-based network printing method and system which obviates the above-mentioned problems. A computer-based network print method and system according to the present invention enables a user to print documents from any printer connected to the system.

20 For that purpose, the present invention includes a printer having an operation unit and a host computer. The host computer receives image data to be printed send by a user by way of a terminal computer. The host computer stores the image data with a unique job number,

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sends the job number to the terminal computer and this terminal computer displays the job number to the user. The user may then enter the displayed job number on an operation unit of any printer selected by the user, and in response, the host computer downloads the stored image data associated with the inputted job number to the selected printer and the selected printer prints the document.

Furthermore, other users are prevented from breaching the confidentiality of the printed document because only the intended recipient (i.e., the user who originated print job) knows the user's password and job number and because the intended recipient is located at the printer and can "guard" the printed document from being viewed by other people. To this end, in this invention, a host computer or printer stores the password inputted by a user, and for printing, when the stored password and an inputted password match, documents are printed from the printer on which the user inputs the job number and password.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a block diagram of a network system using a network print system according to present invention;

Fig. 2 is a diagram of each block in Fig. 1 and an interface between each block; and

Fig. 3 is a flowchart of an operation of this network system including user operations

for the computer and the printer.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals designate identical or
5 corresponding parts throughout the several views Fig. 1 is a block diagram of a computer-
based network using a computer-based network print system according to present invention.
As illustrated the computer-based network system includes four computers for four users, two
network servers, four printers, two print servers and one host computer. Of course other
configurations are possible as well. In Fig. 1 two computers (101-102, and 103-104) are
connected to each network servers 105 and 106. In turn, the two network servers 105 and 106
are connected to a host computer 113, which controls the entire network. The network
servers 105 and 106 and the host computer 113 communicate with each other by a bus.

Also shown in Fig. 1 are two printer pairs (107-108, and 109-110) respectively
connected to print servers 111 and 112. The two print servers 111 and 112 are connected to
the host computer 113. The print servers 111 and 112 control printing according to
authorization commands from the host computer 113, and the printers 107, 108, 109 and 110
work according under the control of the printer servers 111 and 112.

In this network system, four users (Users A-D, as identified in Fig. 1) send print
information, in the form of image data, text data and so on, to the host computer 113 by way
20 of the network servers 105 and 106. Furthermore, each of the four users have complete
control over which of the four printers 107, 108, 109 and 110, the user would like to effect the
print operation. Control over selecting the printer is carried out by the user, who, by entering

on a keypad of the desired printer, the user's password and print job number. Alternatively, the user may simply enter the job number, if no passwords are required.

Fig. 2 is a diagram of each block in Fig. 1 and an interface between each block. The host computer 113 has a video and command data interface unit (not shown) that connects to the network server 105 and the print server 111. The network server 105 has a computer interface unit for connecting to the computer 101. The printer 107 has a video and command data interface for connecting to the print server 111, an image data processing unit for processing image data, a printer controller which has a CPU for controlling the printer apparatus, a ROM for storing a controlling program and a RAM for storing controlling data, an operation panel control unit for controlling an operational panel, on which the user may enter data and view displayed information.

The print server 111 receives data for example, a user password, a job number and an image data, from the host computer 113, and receives a job number and password inputted by user from the operation panel.

In this network system, data for printing is sent from the computer 101 to the network server 105, which processes the data and sends the processed data to the host computer 113. The host computer 113 matches a job number with the password (assigned to the user or established by the host computer) and the image data to be printed, as supplied from the computer 101 by way of the network server 105. The user is then free to go to any printer on the network and have the document printed therefrom. To this end, the user walks to a printer (e.g., printer 107) and inputs the job number and password on the printer's operation panel. Alternatively, the user need not be physically present, but send control commands to the

selected printer 107, identifying the password and job number, as if the user had entered this information on the printer's keypad. The selected printer 107 then requests the password and job number be verified by the host computer 113, by passing the password and job number provided by the user through the print server 111 to the host computer 113.

5 Fig. 3 is a flowchart of an operation of the present computer-based network system and includes user operations performed by the user on the computer terminal, operations performed by the network computer or host computer, and operations performed by the printer server or printer. The process begins in step S1 where a user employs the computer terminal to dispatch a print request message, with image data, to the network server. Next, in step S2 the network server receives the print request signal, with image data, and sends a related message to the host computer. The host computer then registers the job number and password with the image data sent from the network computer. As part of step S2, the host computer sends the job number, password and the image data to the print server and also sends the job number and password to the computer display so the user can view the job number and password assigned by the host computer to the print job. Alternatively, the host computer only sends the job number, and the user merely uses a personal password, or no password at all.

20 The process then proceeds to step S3 where the print server registers the job number and password according to the information sent from the host computer. Alternatively, the job number and password are retained by the host computer and the print server remains passive and awaits the user to enter a job number and password on the printer's keypad, whereby the print server will relay the entered job number and password to the host

computer.

When the user actually makes the print request, the user inputs the job number and password on the keypad of any selected printer (step S4). The selected printer then sends this information to the print server, which in step S5 verifies that the inputted job number and password match that provided by the host computer. Alternatively, the host computer performs the verification. If the response to the inquiry in step S5 is affirmative, the process proceeds to step S6, where the selected printer prints the image data, and the process ends.

However, if the response to the inquiry in step S5 is affirmative, the process proceeds to step S7 where the print server sends the inputted job number and password to the host computer, which performs a secondary verification in step S8 and sends a result message to the printer server. In step S9 the print server interprets the result message from the host computer, and determines conclusively whether the job number and password from entered by the user are the same as those originally assigned by the host computer. If the result of the inquiry in step S9 is negative, the printer displays an error message and the process ends. However, if the response to the inquiry in step S9 is positive, the process proceeds to step S11 where the image data is downloaded to the printer and the printer prints the document.

In the above-described computer-based network system, a user who sends a print signal is able to have the desired document from any printer connected to the network. Furthermore, the user may have the document printed with a reasonably high degree of certainty that the confidentiality of the document will not be compromised because only users who know the password and job number are able to activate the printing of the document at the selected printer.

This invention may be conveniently implemented using a conventional general purpose digital computer or microprocessor programmed according to the teachings of the present specification, as will be apparent to those skilled in the computer art. Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure, as will be apparent to those skilled in the software art. The invention may also be implemented by the preparation of application specific integrated circuit or by interconnecting an appropriate network of conventional components, as will be readily apparent to those skilled in the art.

This application is based on Japanese patent application 9-058482 filed in the Japanese Patent Office on February 25, 1997, the entire contents of which are hereby incorporated by reference.